SOME SURGICAL CONSIDERATIONS PERTAINING TO GASTRIC DILATATION.

BY A. M. POND, M.D.,
OF WEBSTER CITY, IOWA.

THE condition of gastric dilatation is so common and constant a feature of many diseases of the stomach, that it has really come to form quite a distinct position of its own, and one, it would seem, which demands special analysis and definition.

There is a constant and fixed relation existing in the normal stomach between the gastric contents, the muscular ability of the stomach wall, and the resistance offered at the pyloric ring; and it is quite obvious that any change in the elemental dynamics of digestion must lead to a consequential disturbance of function, and that disturbance is usually dilatation, unless, perchance, there should exist a compensating hypertrophy in the musculature of the stomach, which, in spite of the resistance offered at the pyloric ring, still maintains the proper relations, and thus the secondary changes do not occur.

The cause of all gastric dilatation should be sought. If the symptom be due to simple atony, or to the atrophic changes in the gastric muscle, the history may extend over a period of years. Quite in contrast to this statement, if the dilatation be due to some of the mechanical obstructions which are secondary to pathological changes at or near the pylorus, the history may not extend over many weeks or months.

The etiology of gastric dilatation, in general, may be said to arise from two very comprehensive sources. Mechanical forces, obstructing the outlet of stomach, and thus increasing the resistance offered at the ring; and debilitating conditions occurring within the stomach wall, permitting an increase in the volume of stomach contents, which is more or less a sequence to the inability to bring the contents to a level which permits duodenal drainage or evacuation.

The mechanical sources may be classed as extrinsic and intrinsic; or, causes arising from without and causes occurring within the stomach wall itself. The extrinsic causes may be due to tumors or to pathological conditions of adjacent tissue or organs. Tumors commonly causing pressure on the duodenum or pylorus sufficient to produce a stenosis or stricture may be an enlarged gall-bladder or a gall-bladder filled with calculi, a pancreatic cyst or tumor of the pancreas, omental tumors, growths of the liver, or enlargement of the retroperitoneal glands.

The pathological changes in the adjacent tissue capable of causing gastric dilatation may be a perigastritis which has proceeded from a cholecystitis, or empyema of the gall-bladder. The local peritonitis thus excited by some inflammatory condition of the gall-bladder forms bands of plastic exudate which involve the pyloric end of the stomach, in closest proximity, and which sometimes completely encircle the small end of the stomach in its contractures. This condition was noted twice in a series of thirty-six cases. In one case the provoking cause was simple cholecystitis; in the other, there were noted changes in the gall-bladder, and thirty-four small gall-stones were removed.

Prolapsed right kidney evidently has a very important rôle in gastric dilatation, but whether the dilatation is produced by the displacement of the kidney is at question. Suffice it to say, that the coincidence is far from rare in the observation of many writers.

Bartels was the first to discuss the relation existing between floating kidney and gastric dilatation, and assigned as a cause the production of a kink in the pylorus. My colleague, Dr. A. C. Delacroix, in an experience of fifty cases, found right prolapsed kidney in 25 per cent. of the cases, and prolapsed left and right kidney in 10 per cent. Litten has found this condition in 55 per cent. of his cases. These observations would lead to a belief that it was more than mere coincidence, and that the descent of the kidney, from any cause whatever, might be associated with gastric dilatation, since it would hardly be probable that the primary dilatation could produce, or be a factor in the production of, malposition of the kidney.

The Intrinsic Causes.—By far the commonest cause of gastric dilatation arising within the wall of the stomach is a cicatrix of a corrosion or ulcer; in the event of the former, the cicatrix takes the form of hyperplasia or hypertrophy of the pyloric end of the stomach, or the ring, and is not surrounded by the evidence of so extensive inflammation as is found in the cicatrix of an ulcer, where the adhesions may be attached to the liver or parietal peritoneum without, as well as encroaching upon the lumen of the pylorus within. Polypi may arise from the site of hyperplasia caused by erosion, and may be of sufficient size to obstruct the canal.

Spasm of the pylorus may occur for a long time after the healing of a pyloric ulcer, or after an ulcer occurring high in the duodenum, at or near the ring. Such spasm is not, as a rule, continuous, but is extremely likely to be excited after a hearty meal, by the irritation of the passage of the gastric contents over the sensitive scar. When it does occur, it is quite sufficient to produce a lessening of the lumen, and a consequential sagging of the stomach wall.

Carcinoma of the pylorus acts in a similar manner as described in the cicatrices of corrosion and ulcer. There is a thickened wall lessening the outlet, and demanding increased force of the musculature of the stomach to expel the stomach contents through the stenosed pyloric ring. This force is gradually lessened by reason of the lowered nutrition, and soon the stomach sags below a point of duodenal drainage.

There remains but one other condition under the head of causes arising from within, and that is so rare that I mention it merely to complete the classification, *i.e.*, congenital stenosis. This was first described by Williams in 1841, and since that time but forty cases are recorded.

The debilitating causes must be considered as atonic, or conditions due to the temporary weakness of the gastric muscle, and atrophic, or causes arising from a pathological atrophy occurring in the muscle wall.

Atonic Causes.—These may be the result of a lowered general vitality, as in convalescence from a long-continued illness, excessive mental strain or worry, which, in turn, produces disturbance of the motor nerve fibres, and the muscle is not sufficiently stimulated by nerve energy to contract enough to empty the contents. The gastric juice has acted upon the meal, and a portion of it—the upper portion—has passed on into the intestines; however, the greater portion is left. The contractures of the stomach become weaker and weaker during digestion, and finally cease; the contents which have been acted upon by the gastric juice ferment; the fermentation produces gas; the gas dilates the stomach, dragging on the nerve endings and producing pain. There is mental dulness, and an occasional attack of severe headache as a result of the disturbed metabolism; further than this, the secretion of HCl is always greatly in excess, and is excited by the presence of this fermenting mass in the stomach.

The atrophic changes follow closely on the heels of the condition described above, and may be said to be produced secondary to long-continued atony where the atrophic changes have taken place as a sequence of a lack of proper nutrition; as a result of neurasthenia, where the motor impulse is impaired, and insufficient use of the muscle produces lowered activity and consequential atrophy; and, lastly, as a result of constant dragging or traction, as in the case of a prolapsed kidney, or a tumor of the lower abdomen, involving the gastrohepatic omentum, and drawn down by its adhesions.

Symptoms and Physical Findings.—Perhaps the most valuable symptom is pain. In the gastric dilatation from mechanical extrinsic sources, or from sources arising from without the stomach wall, the pain depends upon the location and character of the obstruction; for instance, if the obstruction be a large gall-bladder, or is due to perigastric adhesions or tumor of the pancreas, the pain would be an acute, tearing pain, following shortly after a meal, and occurring during the contractures of digestion. Again, if the obstruction is a tumor of the omentum or liver, or is due to enlarged retroperitoneal glands or prolapsed kidney, the pressure produces an artificial stenosis of the pylorus, and digestion is not completed. In these conditions, the pain is not acute, but is a dull, heavy, dragging pain, which, indeed, it is, as it is the fermentation of the gastric contents retained by reason of the disturbed dynamics—a stenosed orifice—which produces gas sufficient to dilate the stomach and drag on the peripheral nerve endings. This pain is usually relieved by taking bland food, or sometimes even a drink of water, and it is in these conditions, in conjunction with the same symptoms following the disturbance of gastric tone, that the laity learn to use solutions of sodii bicarbonas; the alkali neutralizes the excess of HCl, and gas, in large quantities, is expelled, and the symptom of pain subsides or entirely disappears.

The character of pain conspicuous in the intrinsic causes is more typical. In cicatrices of corrosions and ulcers, the pain is acute, short, and very severe. Fenwick states, in his "Résumé of 3679 Cases" (1904), that pain is frequent and severe where the walls of the curvature are the site. Growths of the cardiac end are least painful. Pain is greatest after meals.

In the case of polypi arising near the ring, the pain would be more of the character described under extrinsic causes. In other words, it would produce a dull pain, due to the excessive dilatation of the stomach.

Spasm of the pylorus is an acutely painful seizure, but can readily be recognized by the short duration, great severity, and irregularity. In carcinoma, pain is early and, in most cases, is a continuous symptom, varying in severity according to its proximity to the pylorus. The first pain may be dull and oppressive, but later it becomes more acute, simulating the character of the ulcer pain. Pain in the cases proceeding from debilitated muscle wall is, as a rule, due to the excessive fermentation induced by the inability of the musculature of the stomach to evacuate its contents.

It will be observed, then, that the pain in gastric dilatation is sharply defined under two distinct heads. If it be acute, we think of ulcer, perigastric adhesions, gall-bladder encroachments, cicatrix of either ulcer or corrosion, spasm of the pylorus if irregular, and carcinoma. Such pain is increased by eating or drinking, as a rule.

If the pain be dull and dragging, and if it be relieved by taking bland food, or by sodii bicarbonas, we can assume that it is due to obstruction, either from pressure exerted from without, as, for example, tumors, prolapsed kidneys, etc., or it is a consequence of an incompetent muscle wall.

Vomiting is a most significant feature. It accompanies ulcer, stenosis (if severe), spasm, carcinoma, and the more intimately related extrinsic causes, as gall-bladder disease and perigastric adhesions.

In emphatic contrast, it is very rare that vomiting will occur in cases due to the impaired gastric wall. These patients will tell you that they never vomit. In a series of thirty-six cases, I have failed to get a history of involuntary vomiting in a single case, no matter how much they feel the need of it. They seem to find it impossible to empty the stomach by emesis. Consequently, you will find the majority of them using stomach-tubes, having been taught its use by their physician, or they drink large amounts of water, and provoke emesis by tickling the pharynx, or by irritation with the fingers.

The physical findings in gastric dilatation need only to be passed in review, since the ordinary methods of physical examination apply in these cases. Perhaps the commonest physical finding is a splashing on succussion. The symptom is constant, and is exaggerated relatively to the extent of dilatation; one precaution in regard to the reliability of this symptom is its absence after meals, for, as a rule, the relieved stomach rises to nearly its normal position, and the splashing will not be heard.

Quite naturally, the capacity of dilated stomachs is increased in exact ratio to the extent of possible laxity of the stomach wall.

The stomach may be filled with water or air, and then, by means of percussion and observation, its contour may be mapped out. If the patient is prone and the stomach well filled, the marked protuberance of the surface in the epigastric triangle will be noted, and, if water has been used, careful measurement of the contents siphoned after percussion will give the relative increase in size. An examination for prolapsed kidney should be made in all cases in the course of the physical examination, and nephropexy should be included in the operative procedures for relief.

The uses of the Lockwood light, or Gastrodiaphane, was described by Kemp in April, 1904. His method is founded on a series of experiments, and is as follows: Sodii bicarb., grs. xv–xx, is dissolved in a glass (eight ounces) of water; the patient is given this solution in order to neutralize the acidity of the gastric contents. This is immediately followed by another glass (eight ounces) of water, in which are dissolved grs. xv–xx sodii bicarb. and one-eighth gr. of fluorescin. The patient is then taken into a dark room and a Lockwood light, or Gastrodiaphane, is introduced in a manner similar to a common stomach-tube; it is, however, much smaller, and can be manipulated without producing very much gagging or attempts at vomiting. The light is very brilliant, and, contained as it is in a fluorescent medii, the entire stomach can be made out, the lower border located, tumors or hypertrophy of the pylorus identified, and tumors of the liver, the transverse colon, and the omentum covering the area of illumination, can be detected. Kemp has also had excellent results from the use of quinine bisulph., grs. x, dissolved in eight ounces of water, to which are added five minims of acid phosphoric dilute, and this is followed by another glass of water.

The chemical and microscopical findings in gastric contents examination do not require any comment from me at this time; suffice it to say, that no stomach examination is complete without gastric contents examination.

After all, the best and most satisfactory means of reaching a positive diagnosis is by exploratory laparotomy. This reveals the conditions as they are, eliminates all guesses, does away with all hypotheses, and leads the surgeon straight to the seat of the trouble, besides sparing the patient weeks, months, possibly years, of a semi-invalid existence, which he barely tolerates, and during which he is the constant object of the concern, sympathy, and solicitation of his friends and family.

Mere exploration will reveal the extrinsic causes of gastric dilatation, and the diagnostic exploration can be converted into curative operation without further inconvenience or delay. The tumors encroaching upon the duodenum or pylorus may be removed, the perigastric adhesions separated, the cicatrices of corrosions or ulcers palpated, a polypus identified, carcinoma recognized, and surgical procedures undertaken which will most nearly restore the function of the part to normal. Should it be impossible to remove the encroaching tumor, the operation of gastro-enterostomy is clearly indicated. Whether by suture, Murphy button, McGraw ligature, anterior or posterior operation, these important details must be decided according to indications and operative selection.

In stricture or stenosis of the pylorus, proceeding from corrosion or hyperplasia, the operation of pyloric dilatation is to be attempted. This can be done, sometimes, by invagination through the wall of the stomach as practised by Hahn. Loreta made an operation known as " Pylorodiosis," in which he dilated the pylorus ring through an incision on the anterior wall of the stomach. The dilatation was accomplished by stretching with the fingers, and, while apparently a simple procedure, was followed by a mortality rate that would hardly commend it to the conservative surgeon.

Pyloroplasty was originated for the same class of cases. The simple, perpendicular incision, and the longitudinal suture of the same, was modified by Mayo Robinson introducing a bone bobbin into the lumen of the ring.

Unquestionably, the operation of choice in this condition is gastro-enterostomy, unless sufficient dilatation can be had by invagination. Gastro-enterostomy, or Finney's operation of gastroduodenostomy, is equally as well suited in cases of cicatrices of corrosion or ulcer, providing the cicatrix is on the anterior surface of the stomach. Where the cicatrix is found at or near the pylorus, gastro-enterostomy is to be preferred. Pylorectomy, or partial gasterectomy, is obviously indicated in carcinoma where the growth occurs at or near the pyloric end.

In meeting the requirements for restoration of impaired function due to atony or atrophic changes in the muscularis, the simplest procedure that promises the greatest restoration, and at the same time does not in any way endanger the patient, is, perhaps, gastroplication. The greatest objection to this operation in the past has been the fact that it leaves the mucosa either in rugea or one large fold, which gives opportunity for the retention of fermenting contents of the stomach, thus producing a recurrence of the symptom. In the last three cases of gastric dilatation due to the impaired stomach wall, the writer has modified the standard operation, which procedure overcomes these objections. Sufficient time, however, has not elapsed to warrant a description of the operation. The last case was operated June 4. In each instance very satisfactory results have followed. The success of the operation, however, is dependent upon two very important factors, *i.e.*, patency of the pyloric orifice, and the ability of the gastric muscle to regain its normal tone.